



International PtX Hub

Centre of **EXPERTISE** and **COLLABORATION**

With strong international networks for a sustainable market development

On behalf of:



Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety

of the Federal Republic of Germany





CBAM PtX toolkit

- Components
- Objectives
- Takeaways
- What has changed?

A joint effort between

International Hydrogen Ramp-up
Programme – H2Uppp



On behalf of:



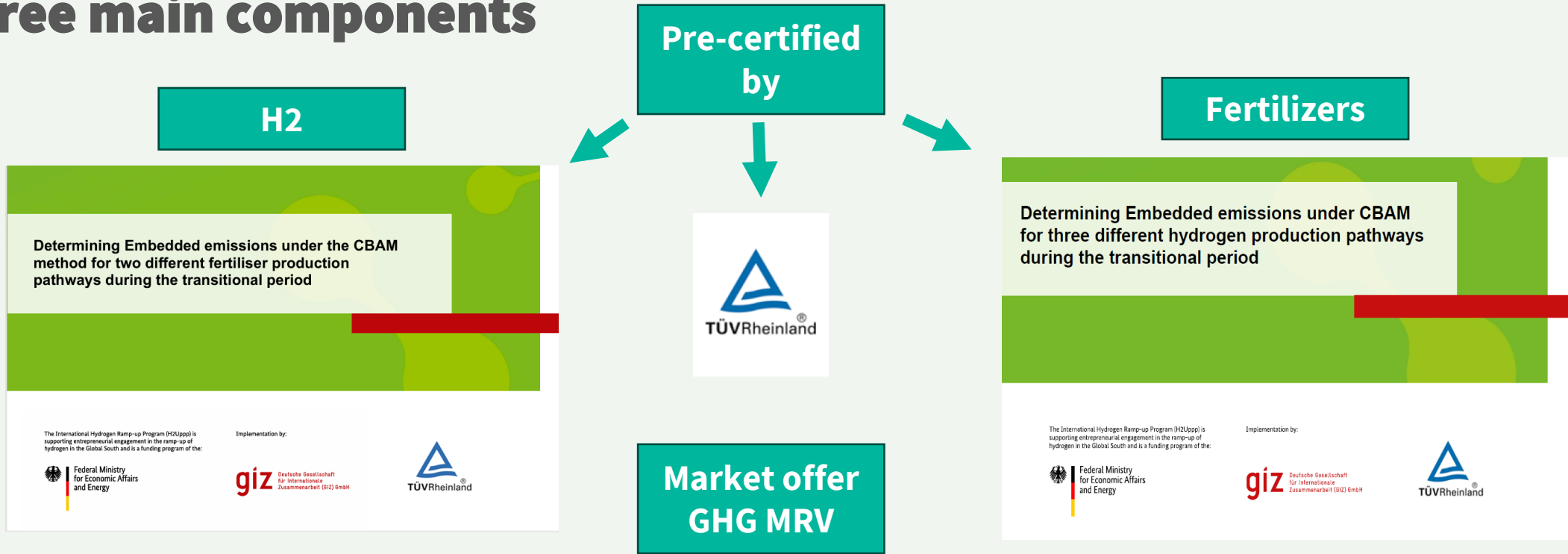
of the Federal Republic of Germany



Implemented by



Three main components



[Link to the toolkit](#)

Introduction

This Document provides an overview of the services offered by various service providers on the EU Carbon Border Adjustment Mechanism (CBAM) Carbon Emissions Calculation and Determination, Monitoring and Reporting and other relevant support services. The data presented has been collected by virtue of a comprehensive market analysis and a market survey targeting companies providing services in relation to the Carbon Border Adjustment Mechanism (CBAM) monitoring, reporting, determination of embedded emissions and other relevant support services.

The companies/organisations are divided into three categories; Emission Calculation, Reporting and Monitoring and Education Reporting and Monitoring~ Companies in this category provide data management, emission accounting, certificate costs calculation, report creation and submission on quarterly basis. Moreover, some companies also offer consultancy on risk management.

Emission Calculation~Companies in this category provide emission accounting or carbon footprint calculation services, including estimation of CBAM certificate costs.

Education~Companies in this category offer materials to better understand the regulatory and compliance process of the EU CBAM.

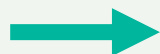
Three core objectives

H2



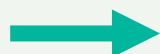
- Introduce and explain the main considerations for hydrogen under the EU Carbon Border Adjustment Mechanism (CBAM)
- Explain the application of the CBAM methodology for emissions accounting to the hydrogen sector.

Fertilizers



- Introduce and explain the main considerations for fertilizers under the EU Carbon Border Adjustment Mechanism (CBAM)
- Explain the application of the CBAM methodology for emissions accounting to fertilizers when renewable hydrogen is used.
- Introduce the formula for the calculation of the financial adjustment

Monitoring and reporting tools



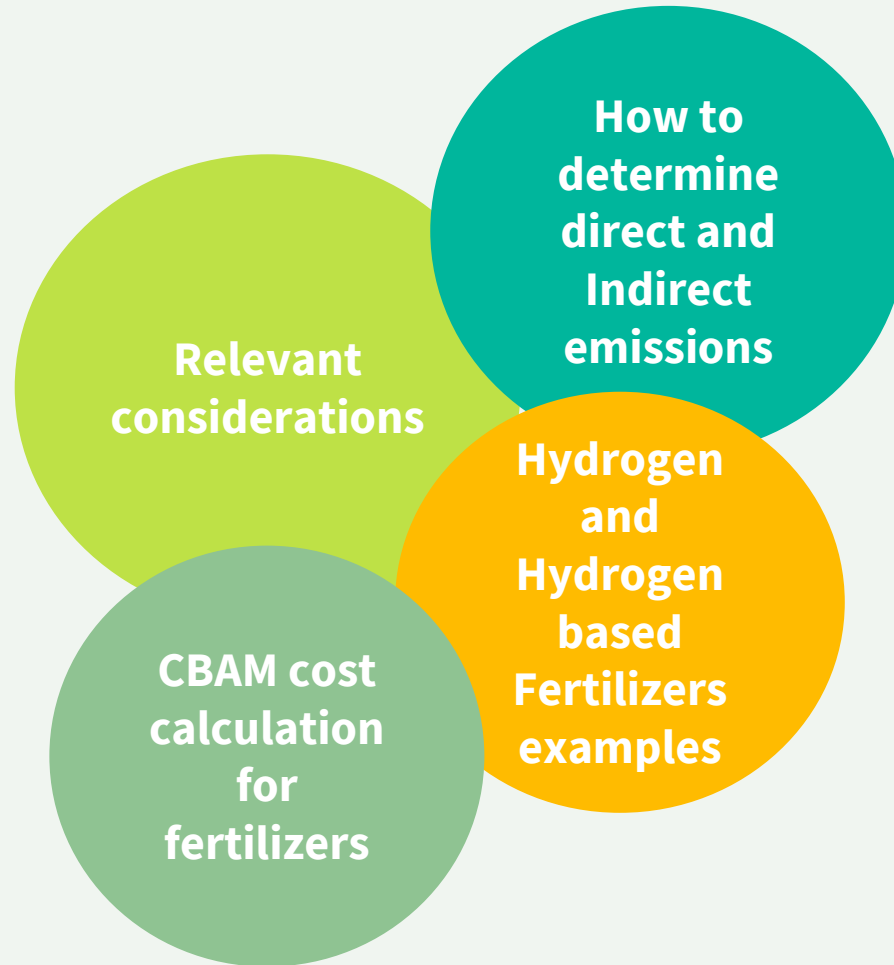
- Provide an overview of how the market offer in shaping with regards to emissions monitoring and reporting CBAM services.

In concrete...

3/19/2026

- GHG emissions scope
- CN codes
- Main elements to determine the financial adjustment
- Actual emissions vs. Default values

Mixed
fertilizer (NPK)



- Monitoring approaches for direct and Indirect emissions
- Attribution of Direct and Indirect emissions
- Explanation of formulas and calculation examples

- Hydrogen: RFNBO, SMR with CCS and Electrolytic
- Fertilizers
Mixed fertilizer using RFNBO H2 and SMR Hydrogen

Our key takeaways Hydrogen (transitional phase)

RFNBOs

$$SEE_{g,dir} = \frac{AttrEm_{g,dir}}{AL_g} = \frac{0}{12,500} = 0$$

$$SEE_{g,indir} = \frac{AttrEm_{g,indir}}{AL_g} = \frac{0}{12,500} = 0$$



0 direct and indirect emissions

SMR with CCS

$$SEE_{g,dir} = \frac{AttrEm_{g,dir}}{AL_g} = \frac{70,728.00 \text{ tCO}_2}{21,600 \text{ tH}_2} = 3.274 \frac{\text{tCO}_2}{\text{tH}_2}$$

$$SEE_{g,indir} = \frac{AttrEm_{g,indir}}{AL_g} = \frac{6,605.28 \text{ tCO}_2}{21,600 \text{ tH}_2} = 0.3058 \frac{\text{tCO}_2}{\text{tH}_2}$$



> RFNBO therefore CBAM costs will apply

Electrolysis (grid electricity)

$$SEE_{g,dir} = \frac{AttrEm_{g,dir}}{AL_g} = \frac{0}{12,500} = 0$$

$$SEE_{g,indir} = \frac{AttrEm_{g,indir}}{AL_g} = \frac{189,735 \text{ tCO}_2}{12,500 \text{ tH}_2} = 15.178 \frac{\text{tCO}_2}{\text{tH}_2}$$



Depends on the emission factor of electricity (0,278 tCO2/MWh)

Standard Method used for the calculation of Direct Emissions

- Requires the quantity of all the fuels and input materials
- Requires calculation factors such as the net calorific value and the emission factor

Our key takeaways Fertilizers (System boundary)

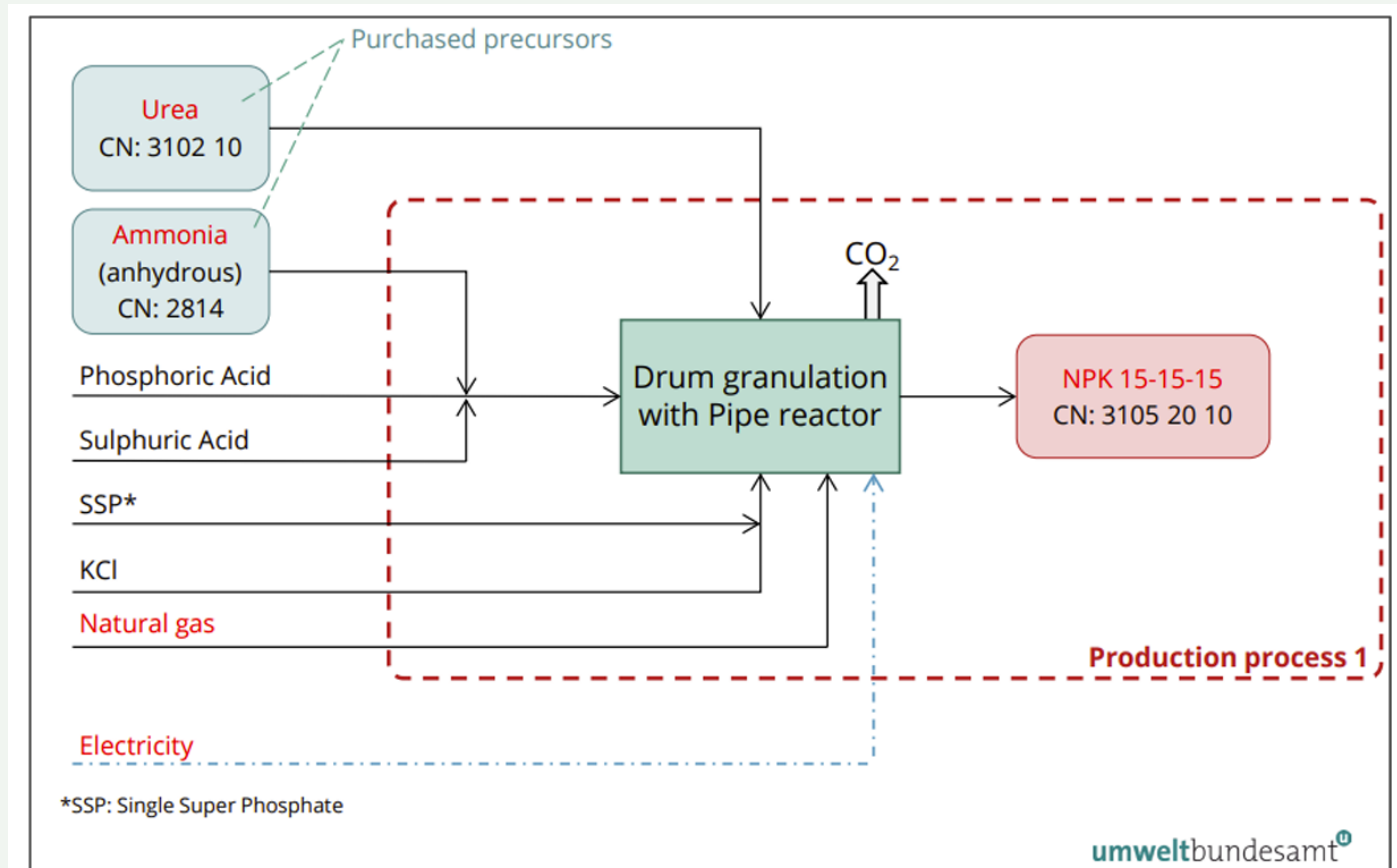


Figure 1 System boundary for mixed fertiliser production

Our key takeaways Fertilizers

Mixed fertilizers using RFNBO and Renewable Electricity

Summary:

| Granulator / Pipe reactor | Aggregated goods category | Mass t | SEE (direct) tCO ₂ e/t | SEE (indirect) tCO ₂ e/t | SEE (total) tCO ₂ e/t | EmbEm (direct) tCO ₂ e | EmbEm (indirect) tCO ₂ e | EmbEm (total) tCO ₂ e |
|----------------------------------|---------------------------|---------|-----------------------------------|-------------------------------------|----------------------------------|-----------------------------------|-------------------------------------|----------------------------------|
| Total production process | Mixed fertilisers | | 0.257 | 0 | 0.186 | | | 18,601 |
| <i>Granulator / Pipe reactor</i> | Mixed fertilisers | 100,000 | 0.018 | 0 | 0.018 | 1,800 | 0 | 1,800 |
| <i>Urea (purum)</i> | Urea | 0.160 | 0.115 | 0 | 0.115 | 11,500 | 0 | 11,500 |
| <i>Ammonia (unhydrous)</i> | Ammonia | 0.093 | 0.053 | 0 | 0.053 | 5,301 | 0 | 5,301 |



Approx. 50% emissions reduction
If certified renewable hydrogen (RFNBO) is introduced and an emission factor of 0 (renewable electricity) is used for all indirect emissions

Mixed fertilizer using SMR hydrogen

Summary:

| | Aggregate d goods category | Mass t | SEE (direct) tCO ₂ e /t | SEE (indirect) tCO ₂ e/t | SEE (Total) tCO ₂ e /t | Mass t | EmbEm (direct) tCO ₂ e | EmbEm (indirect) tCO ₂ e | EmbEm (Total) tCO ₂ e |
|----------------------------------|----------------------------|----------|------------------------------------|-------------------------------------|-----------------------------------|----------------|-----------------------------------|--------------------------------------|----------------------------------|
| Total production process | Mixed fertilisers | 1 | 0.310 | 0.054 | 0.364 | 100,000 | | | 36,400 |
| <i>Granulator / Pipe reactor</i> | Mixed fertilisers | 1 | 0.018 | 0.006 | 0.024 | 100,000 | 1,800 | 600 | 2,400 |
| <i>Urea (purum)</i> | Urea | 0.160 | 0.115 | 0.029 | 0.144 | 16,000 | 11,500 | 2,900 | 14,400 |
| <i>Ammonia (unhydrous)</i> | Ammonia | 0.093 | 0.177 | 0.019 | 0.196 | 9,300 | 17,700 | 1,900 | 19,600 |

Standard Method used for the calculation of Direct Emissions

- Requires the quantity of all the fuels and input materials
- Requires calculation factors such as the net calorific value and the emission factor

Our key takeaways Fertilizers (Ammonia emissions)

Precursors

| Precursor embedded emissions (tCO ₂ /t) | | | | Fertiliser embedded emissions (tCO ₂ /t) | | | |
|--|----------|----------------------------|----------|---|----------|-----------------|----------|
| Ammonia (tCO ₂ /t) | | Urea (tCO ₂ /t) | | Ammonia (93 kg/t) | | Urea (160 kg/t) | |
| Direct | Indirect | Direct | Indirect | Direct | Indirect | Direct | Indirect |
| 1,900 | 0.208 | 0.719 | 0.178 | 0.177 | 0.019 | 0.115 | 0.028 |

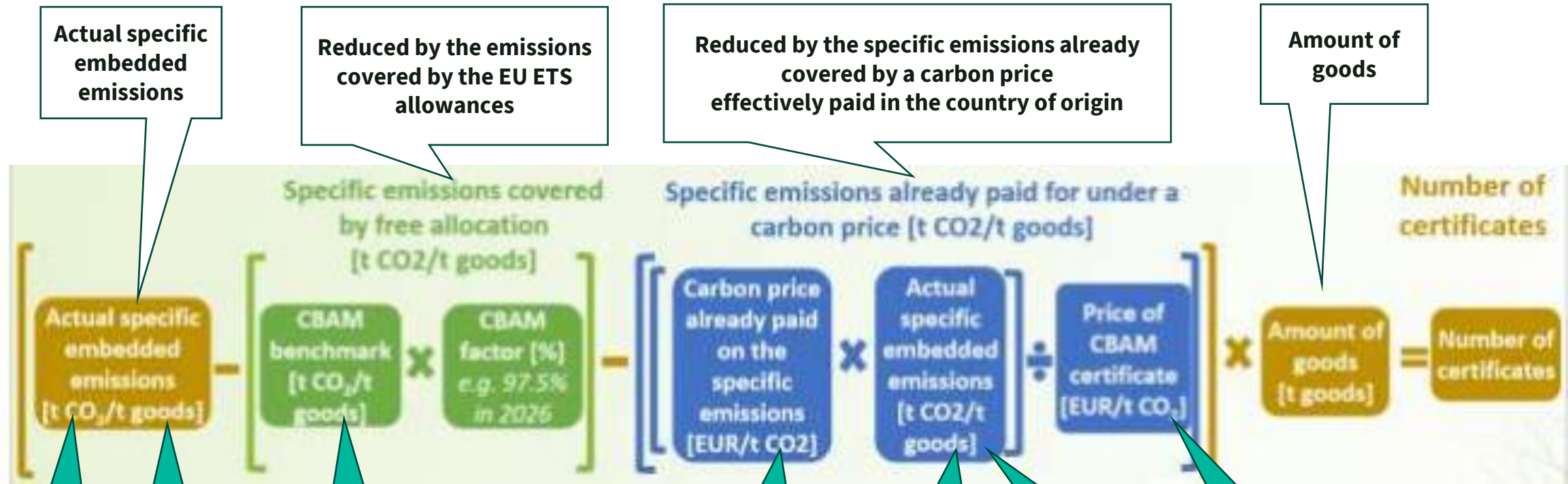
| Precursor embedded emissions (tCO ₂ /t) | | | | Fertiliser embedded emissions (tCO ₂ /t) | | | |
|--|----------|----------------------------|----------|---|----------|-----------------|----------|
| Ammonia (tCO ₂ /t) | | Urea (tCO ₂ /t) | | Ammonia (93 kg/t) | | Urea (160 kg/t) | |
| Direct | Indirect | Direct | Indirect | Direct | Indirect | Direct | Indirect |
| 0.57 | 0 | 0.719 | 0 | 0.053 | 0 | 0.115 | 0 |



Approx. 70% emissions reduction
If certified renewable hydrogen (RFNBO) and renewable electricity is introduced for Ammonia production

Now is time for an update (Before December 2025)

The number of CBAM certificates that each authorised CBAM declarant will surrender will be determined by:



???

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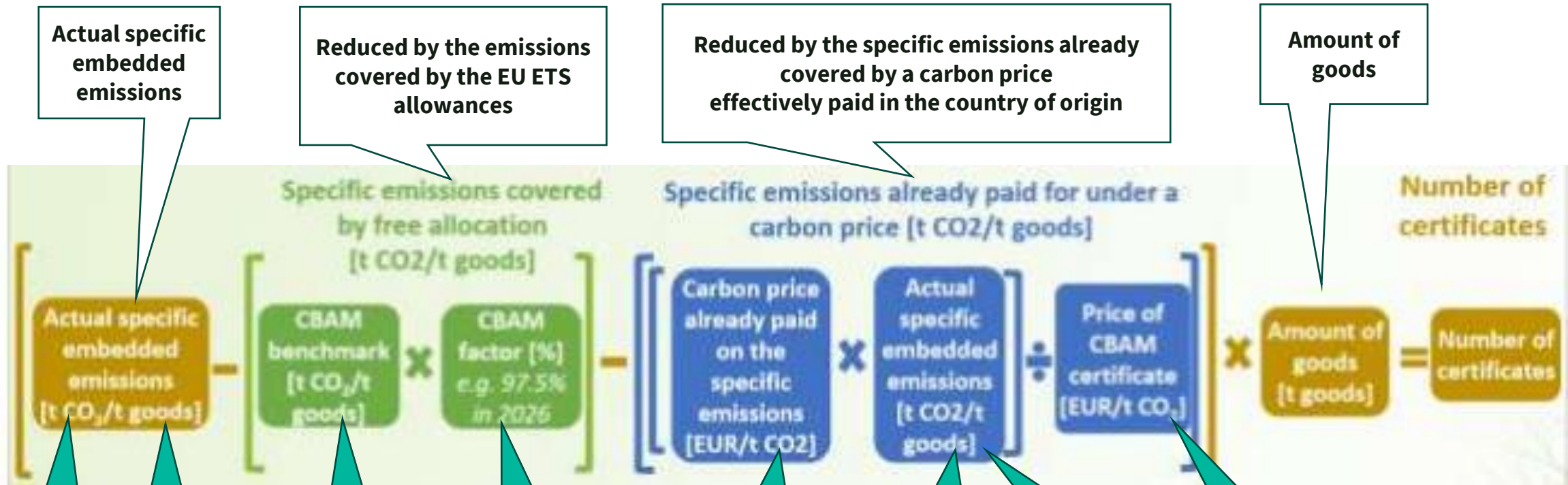
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IA: Implementing acts
DA: Delegated Acts

After December 2025

The number of CBAM certificates that each authorised CBAM declarant will surrender will be determined by:



What has changed and what is still valid (high-level)

3/19/2026

| Has not changed | To be reviewed |
|---|--|
| Rationale and main objectives | Adoption of Omnibus (de minimis 50 tn and others) |
| Emissions scope | Quarterly vs. Yearly CBAM declaration |
| Product scope for H2 and Fertilizers (CN Codes) | Monitoring and reporting format (Monitoring plan / emissions report) |
| System boundaries fundamentals | Decrease in the need of reporting software |
| Calculation formulas | Price of CBAM certificates (first CBAM certificate price to be published in April) |
| | Benchmark values (per CN code) |
| | Default Values (worldwide vs. country specific) + mark-ups |
| | Proposed Art 27 (a) |

Awaiting updated Q&A and guidance documents from the European Commission

Any questions?

Antonio.fernandezrodriguez@giz.de

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